

FIG.1

PRIOR ART

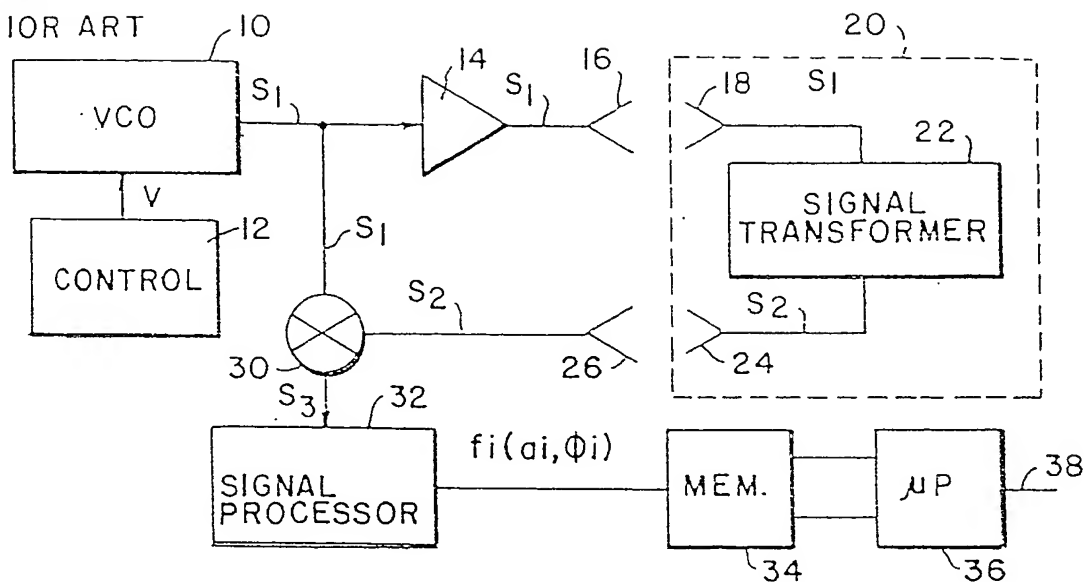


FIG.2

PRIOR ART

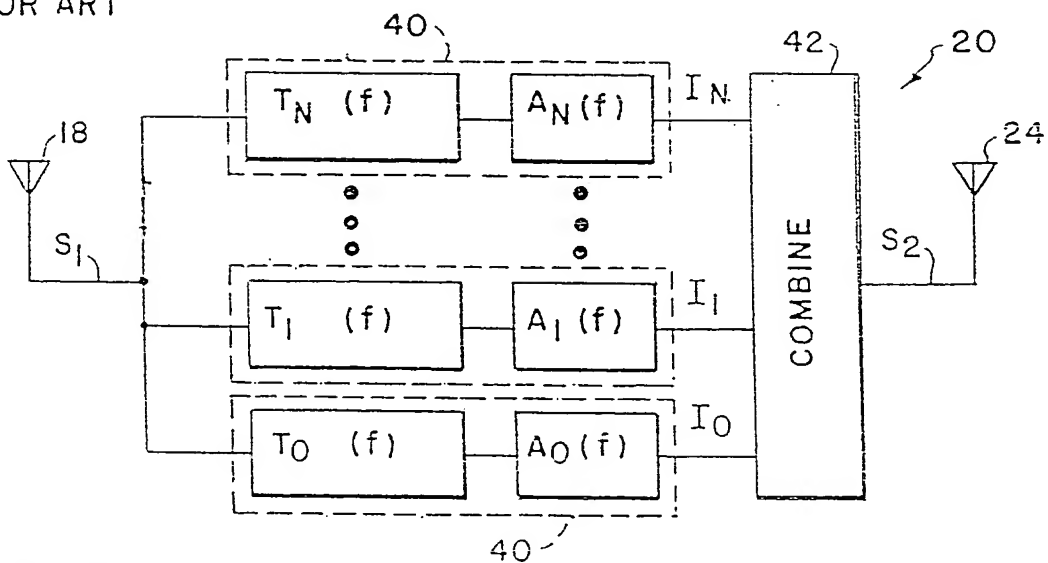


FIG.3A

PRIOR ART

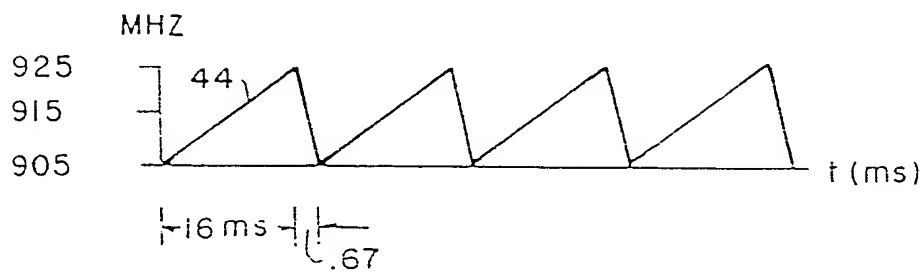


FIG.3B

PRIOR ART

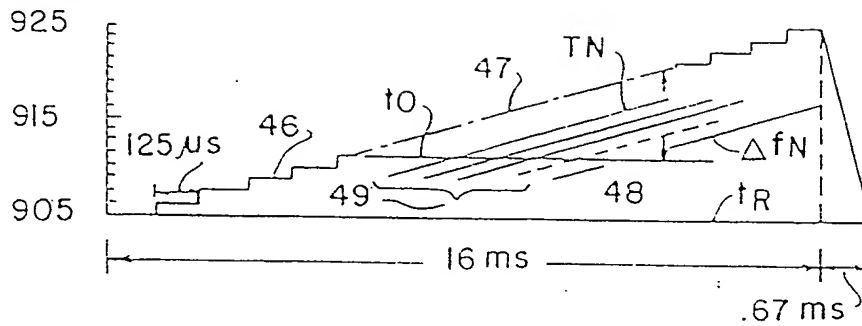


FIG.4

PRIOR ART

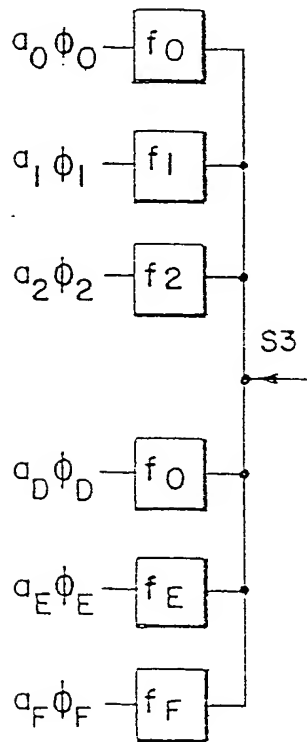


FIG.5

PRIOR ART

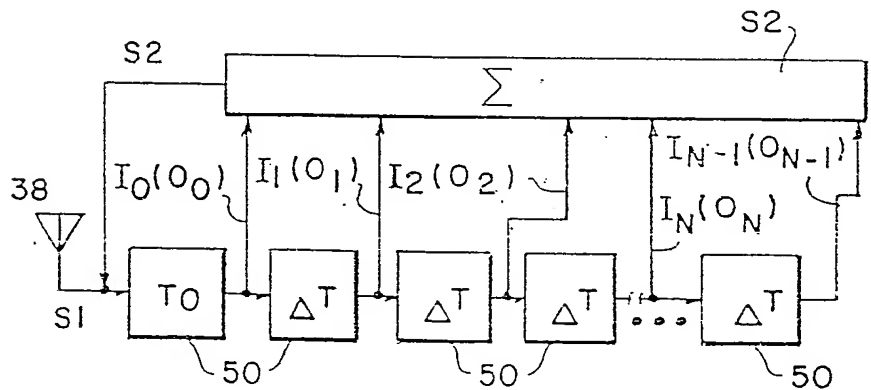


FIG.7

PRIOR ART

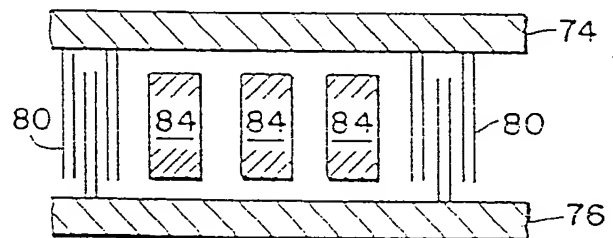


FIG.6

PRIOR ART

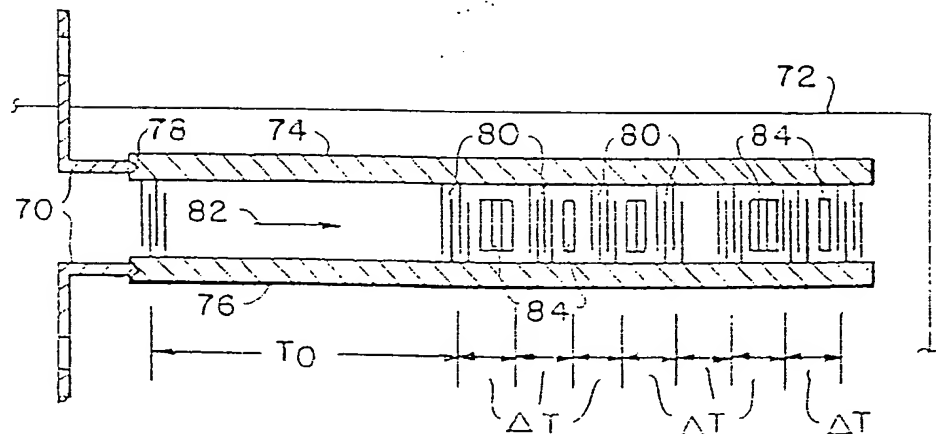


FIG. 9A

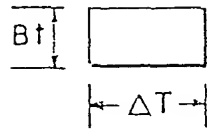


FIG. 9B

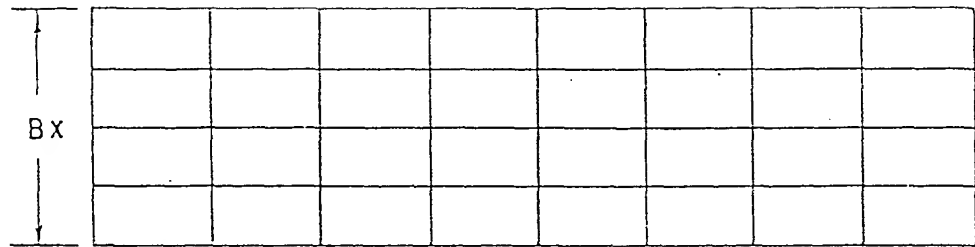


FIG.9C

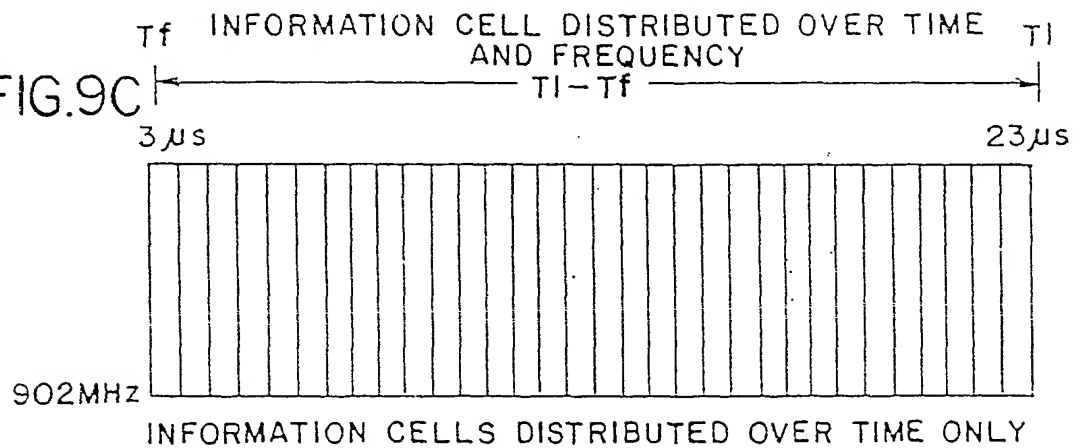


FIG.10A

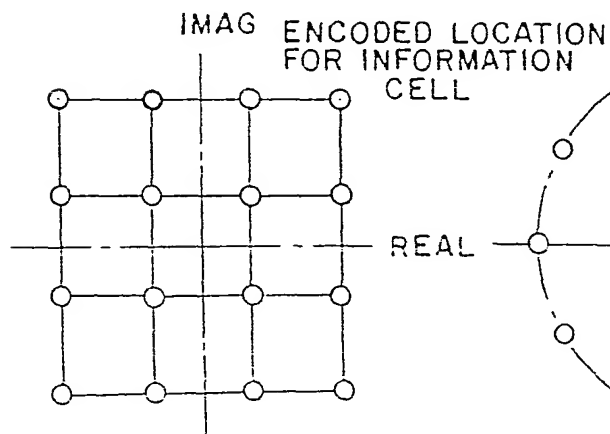


FIG. 10B

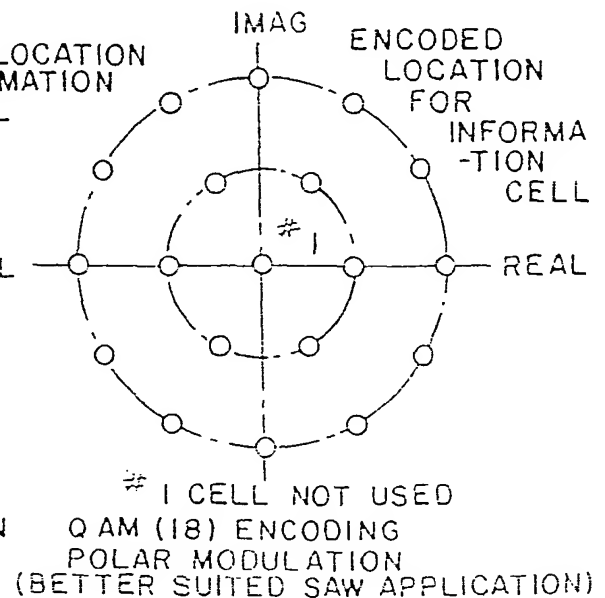
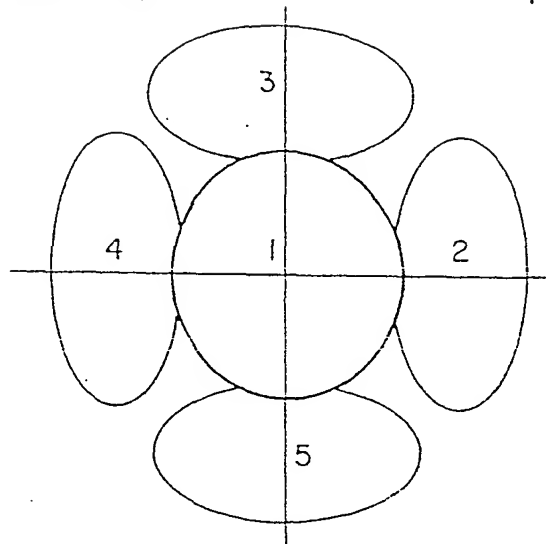
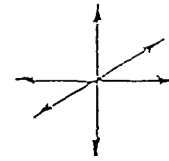


FIG.IIA



BEAM PATTERN COVERAGE USING PATCH LIKE ANTENNA (PROJECTION VIEW)

FIG.IIB



POLARIZATION AXES
POLARIZATION COVERAGE

SPATIAL DISCRIMINATION MULTI-READ
POINTS
SPATIAL COVERAGE

FIG.IIC

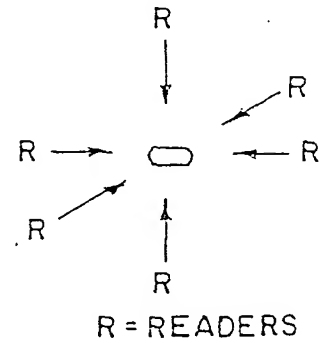


FIG.I2A

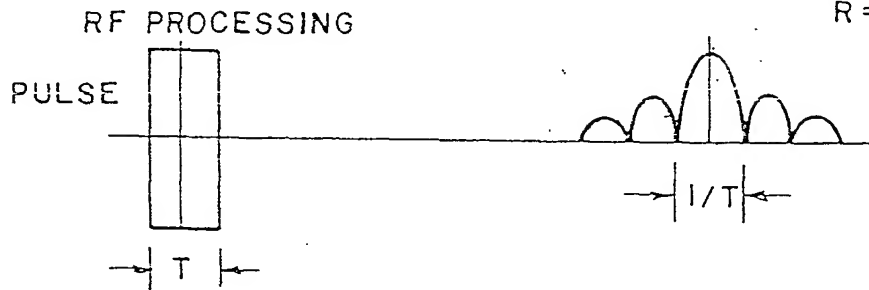


FIG.I2B

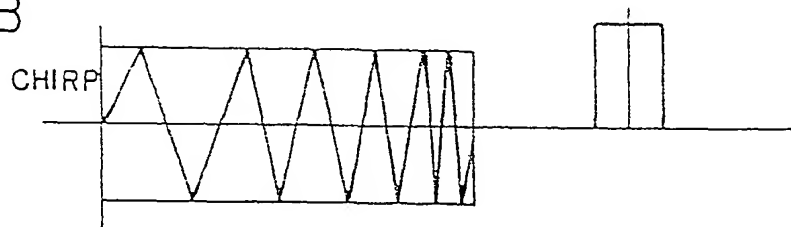


FIG.I2C

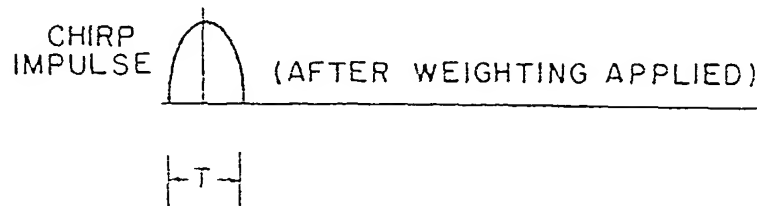
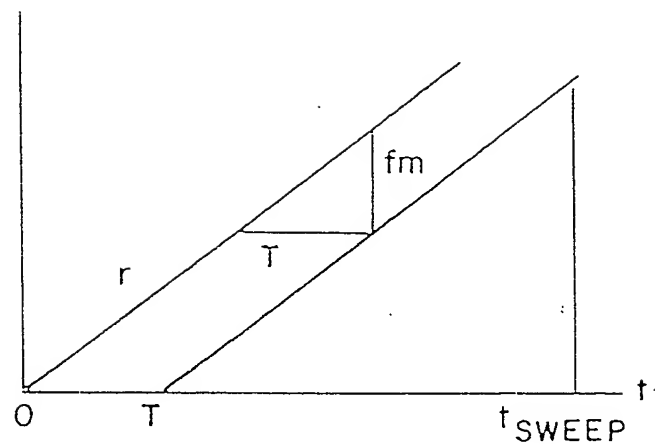


FIG.12D



$$f_m = Tr$$

$$t_{\text{SWEEP}} = \text{SWEEP TIME}$$

$$1/t_{\text{SWEEP}} = \text{NOISE BANDWIDTH OF DETECTOR}$$

FIG.13

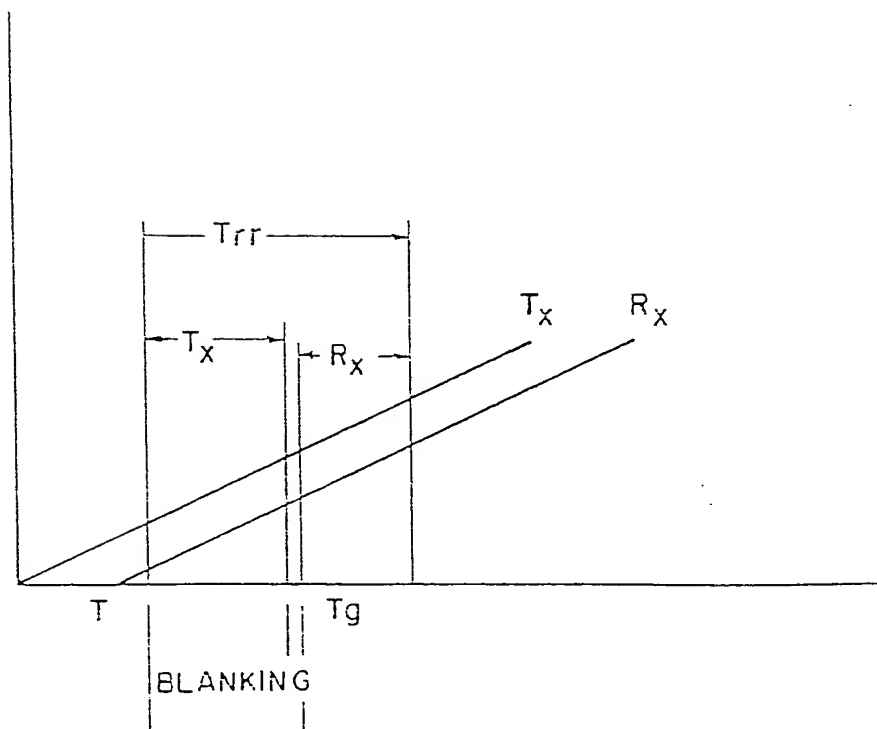
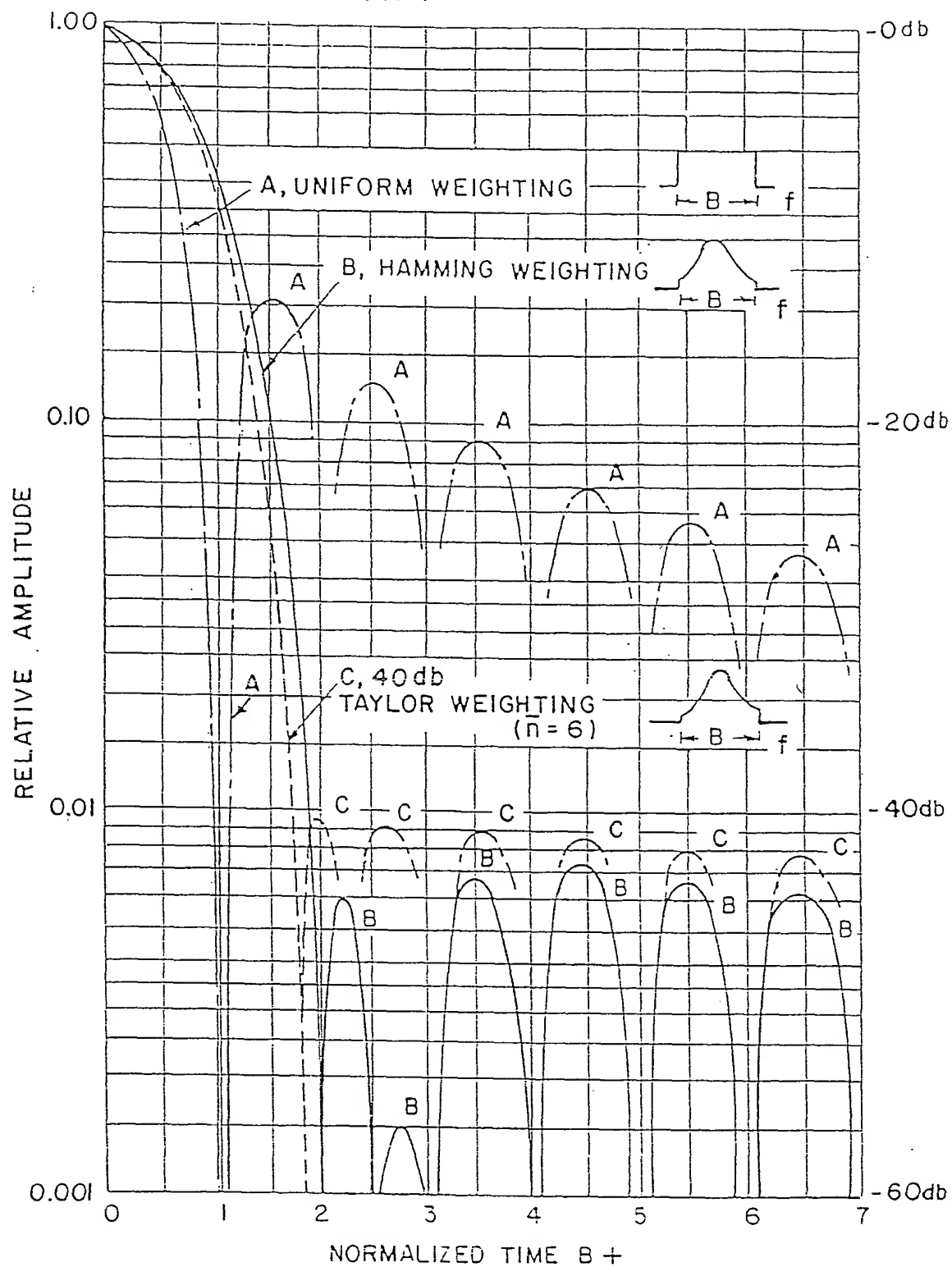


FIG.14



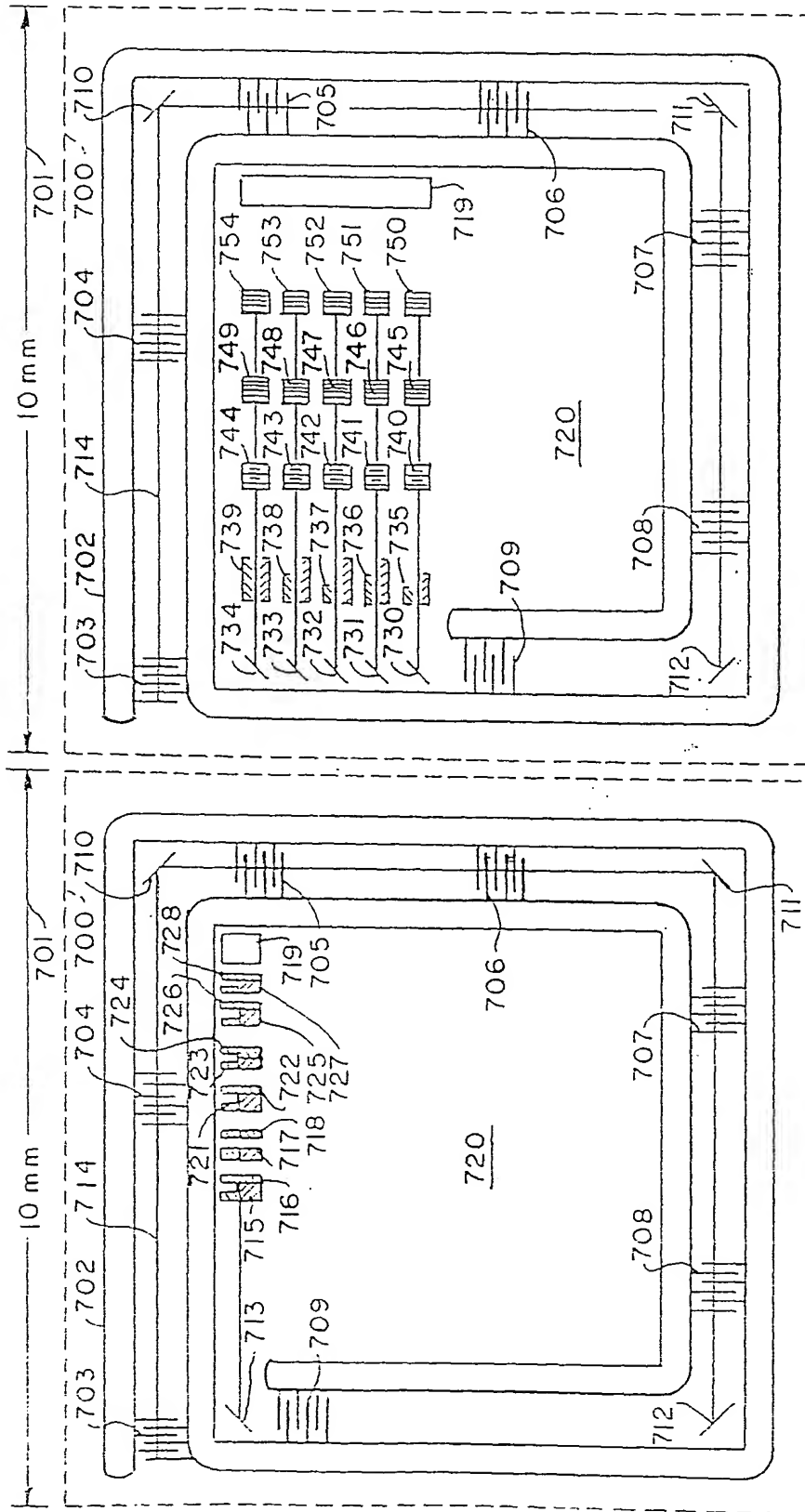


FIG. 15

FIG. 16

TRANSDUCER SELECTED FOR 1 OF NF FREQ BANDS

HIGH EFFICIENCY CORNER REFLECTOR

PARTIAL 90 DEG. REFLECTOR

AMPLITUDE WEIGHTED DELAY PAD

BROAD BAND PARTIAL REFLECTOR

FIG.16

FIG.15

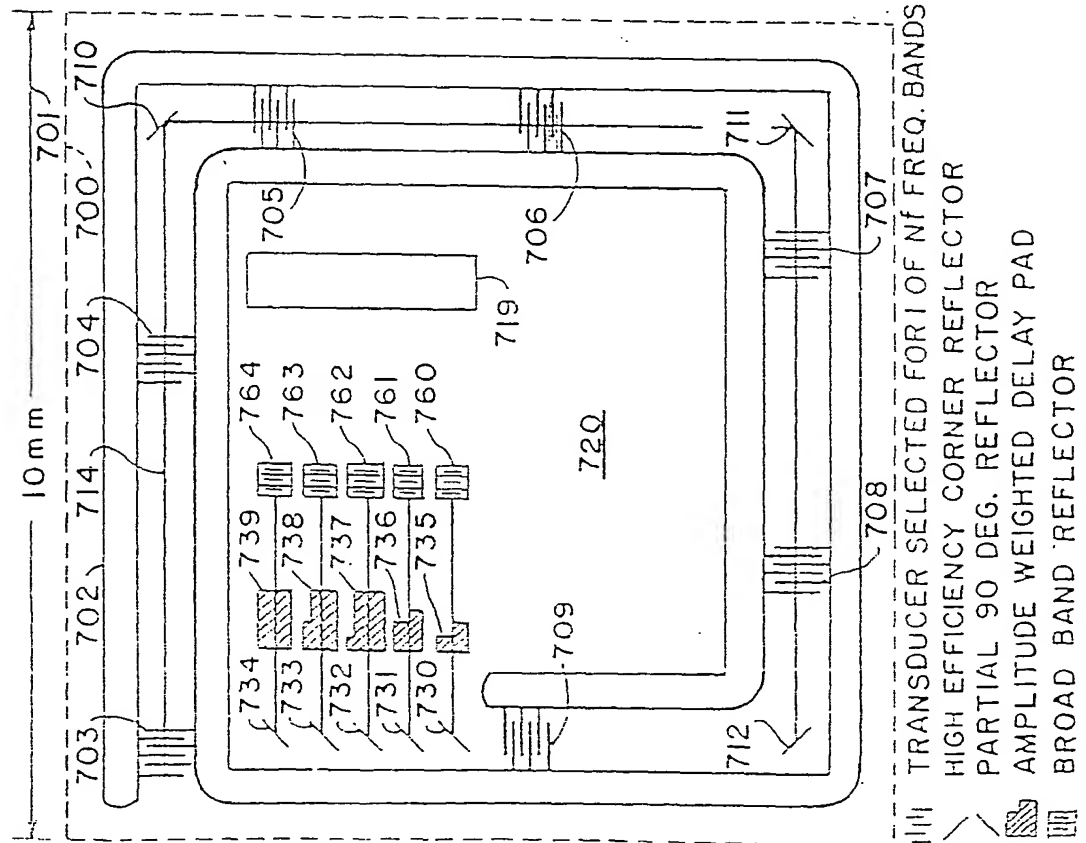


FIG.17

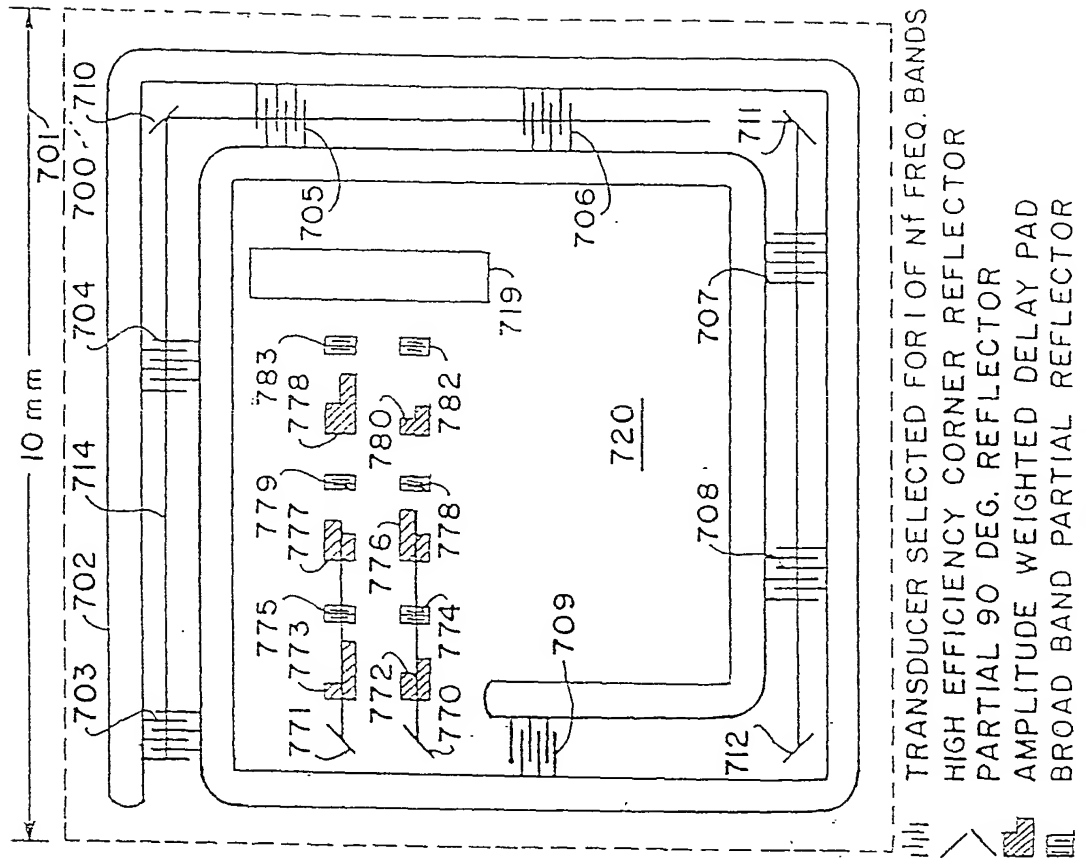


FIG.18

FIG.19A

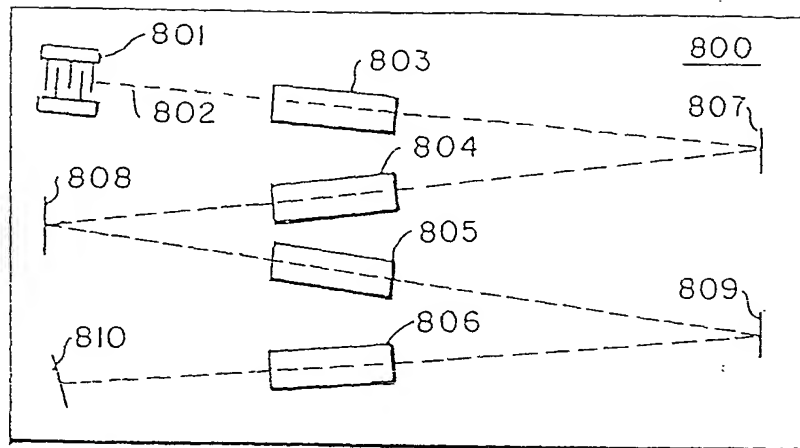


FIG.19B

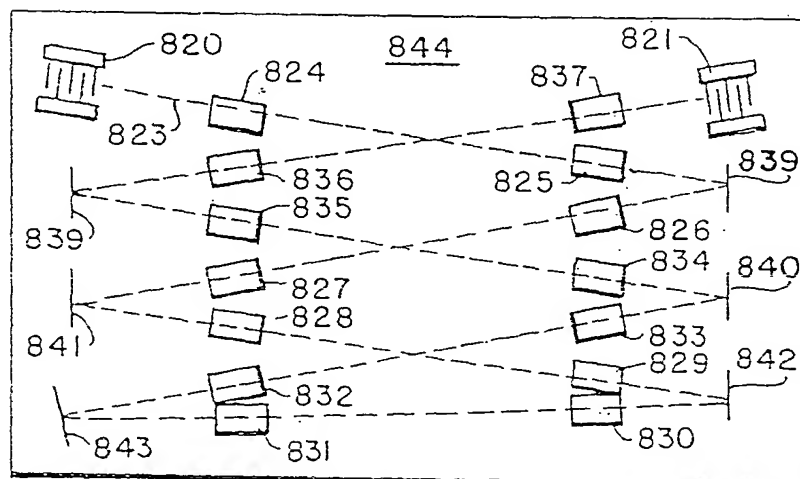
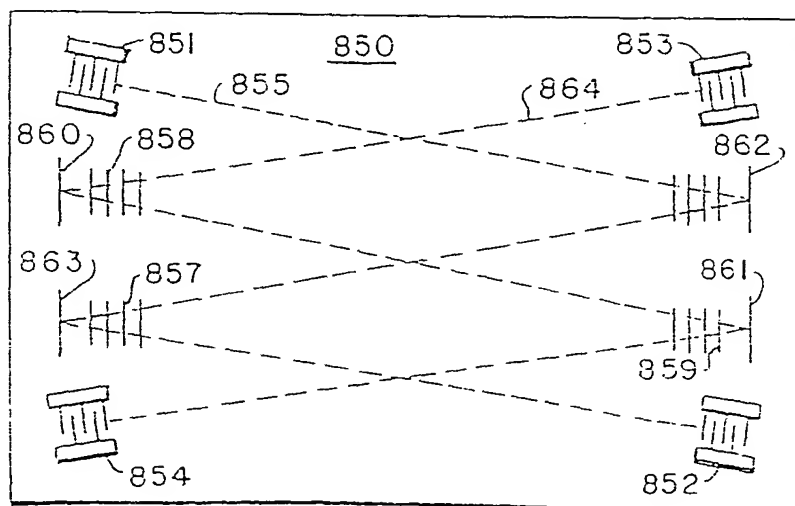


FIG.19C



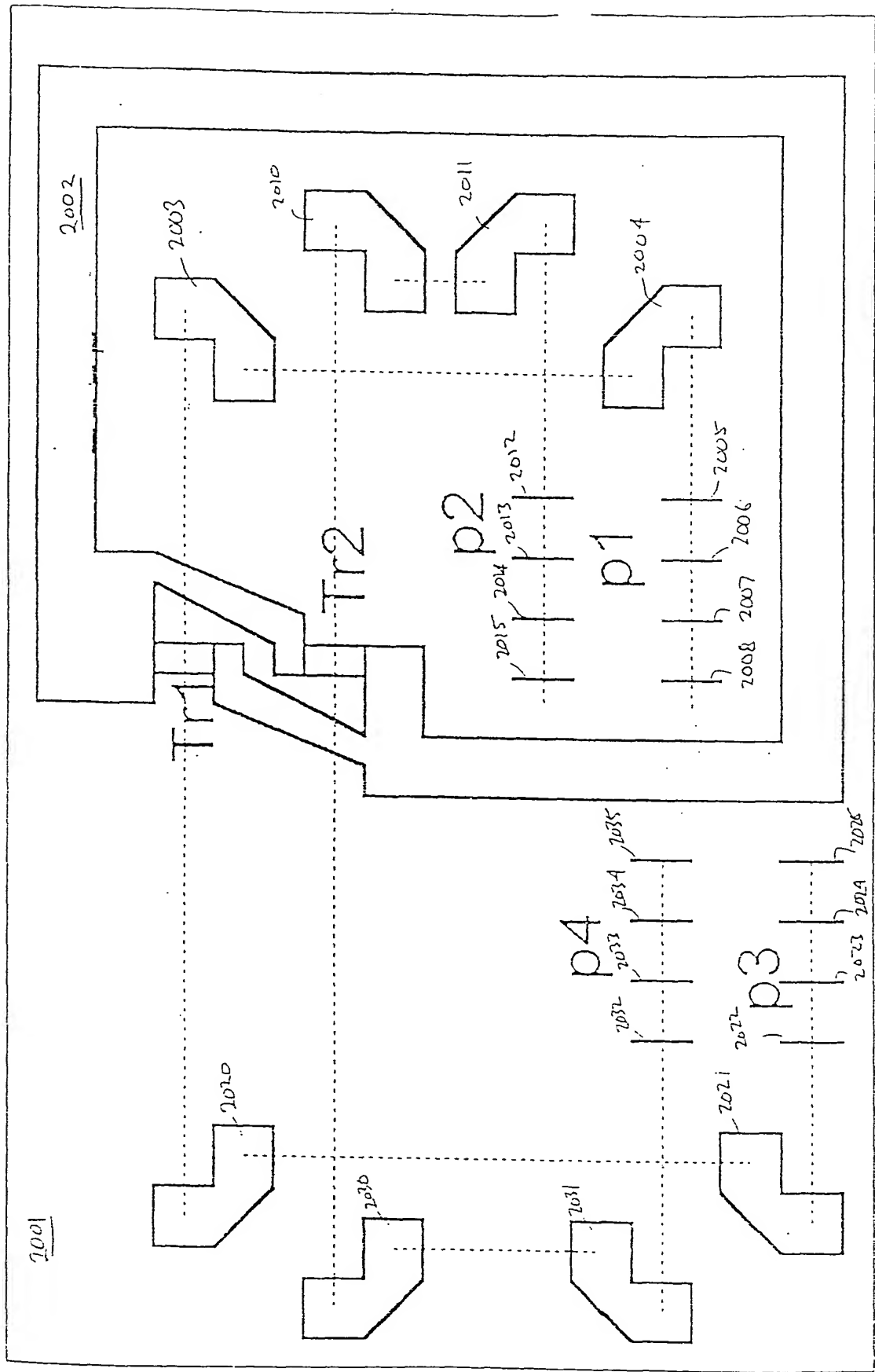


Fig. 20

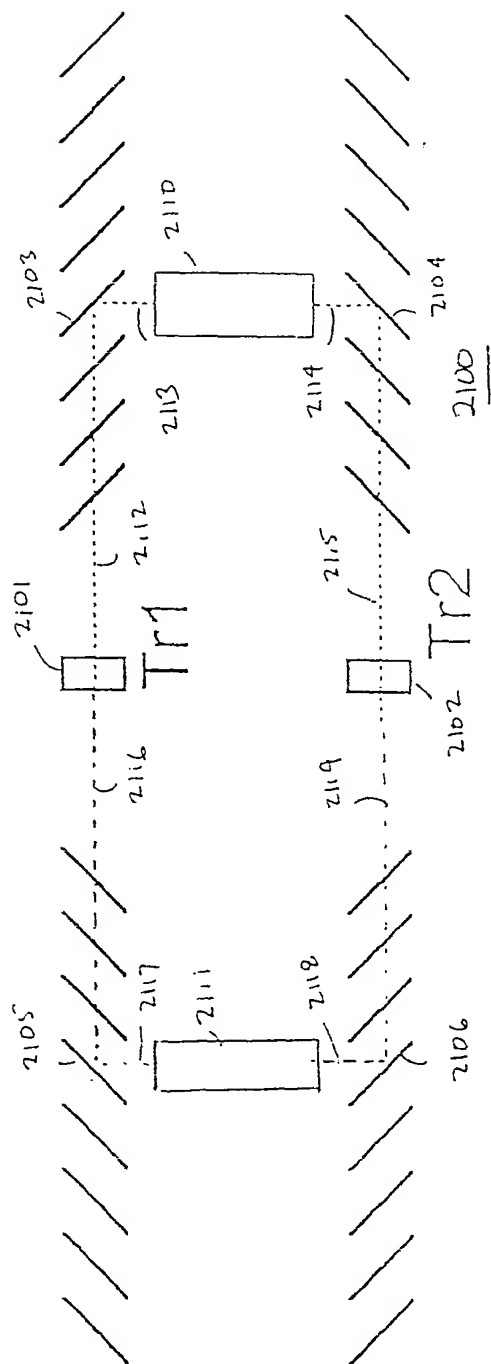


Fig. 21

Calculation of element reflection and resultant loss per tap (excluding transducer loss)
for 16 tap RAC. (8 taps on each side of transducers)

Parameters : top = prop. loss between taps (200 ns delay)
rsp0 = refl. coeff. of 1st tap (one RAC element)
rl0 = prop. loss of 1st tap (1us delay)(dB)

$$\text{top} := 0.977$$

$$rp_0 := 0.04$$

$$rl_0 := 1.0$$

$$rsp_0 := \sqrt{rp_0}$$

$$i := 1..7$$

$$rp_i := \frac{rp_{i-1}}{1 - rp_{i-1}} \cdot \frac{1}{\text{top}}$$

$$rl_i := (1 - rp_i) \cdot \text{top} \cdot \frac{rp_i}{rp_{i-1}} \quad rsp_i := \sqrt{rp_i}$$

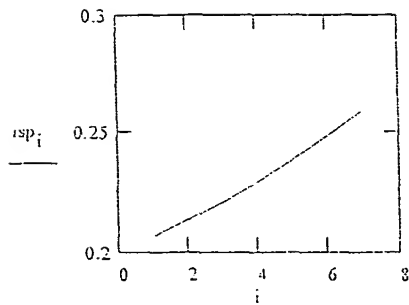
$$tloss_i := 20 \cdot \log(rp_i \cdot rp_0) - 1.0$$

$$tloss_0 := 20 \cdot \log(rp_0) - 1.0$$

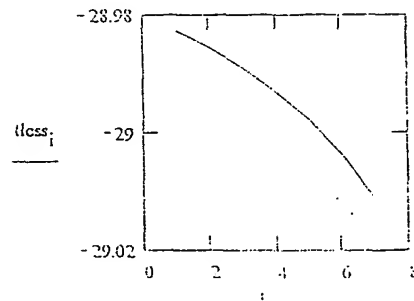
$$rsp = \begin{bmatrix} 0.2 \\ 0.207 \\ 0.214 \\ 0.221 \\ 0.229 \\ 0.238 \\ 0.248 \\ 0.259 \end{bmatrix}$$

$$rl = \begin{bmatrix} 1 \\ 0.997 \\ 0.997 \\ 0.997 \\ 0.996 \\ 0.996 \\ 0.995 \\ 0.994 \end{bmatrix}$$

$$tloss = \begin{bmatrix} -28.959 \\ -28.983 \\ -28.986 \\ -28.989 \\ -28.993 \\ -28.998 \\ -29.004 \\ -29.011 \end{bmatrix}$$



element reflection as funct. of tap #



transm. loss as funct. of tap #, dB

Fig. 22

Calculation of element reflection and resultant loss per tap (excluding transducer loss)
for 16 tap RAC. (8 taps on each side of transducers)

Parameters : top = prop. loss between taps (200 ns delay)
rsp0 = refl. coeff. of 1st tap (one RAC element)
rl0 = prop. loss of 1st tap (1us delay)(dB)

$$\text{top} := 0.977$$

$$rp_0 := 0.0625$$

$$rl_0 := 1.0$$

$$rsp_0 := \sqrt{rp_0}$$

$$i := 1..7$$

$$rp_i := \frac{rp_{i-1}}{1 - rp_{i-1}} \cdot \frac{1}{\text{top}}$$

$$rl_i := (1 - rp_i) \cdot \text{top} \cdot \frac{rp_i}{rp_{i-1}}$$

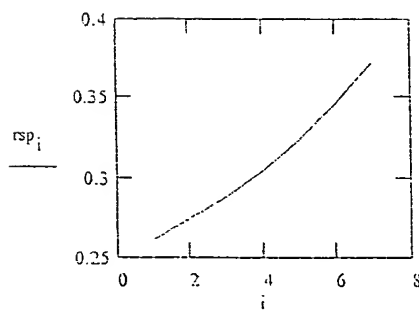
$$rsp_i := \sqrt{rp_i}$$

$$tloss_i := 20 \cdot \log(rl_i \cdot rp_0) - 1.0$$

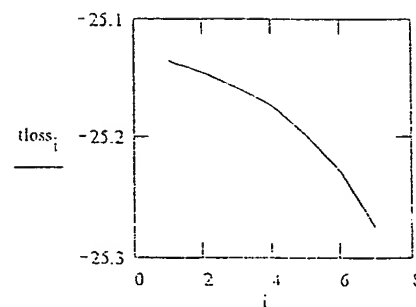
$$tloss_0 := 20 \cdot \log(rp_0) - 1.0$$

$$rsp = \begin{bmatrix} 0.25 \\ 0.261 \\ 0.274 \\ 0.288 \\ 0.304 \\ 0.323 \\ 0.345 \\ 0.372 \end{bmatrix} \quad rl = \begin{bmatrix} 1 \\ 0.994 \\ 0.993 \\ 0.991 \\ 0.989 \\ 0.987 \\ 0.983 \\ 0.978 \end{bmatrix}$$

$$tloss = \begin{bmatrix} -25.082 \\ -25.136 \\ -25.145 \\ -25.158 \\ -25.174 \\ -25.197 \\ -25.228 \\ -25.275 \end{bmatrix}$$



element reflection as funct. of tap #



trans. loss as funct. of tap #, dB

Fig. 23

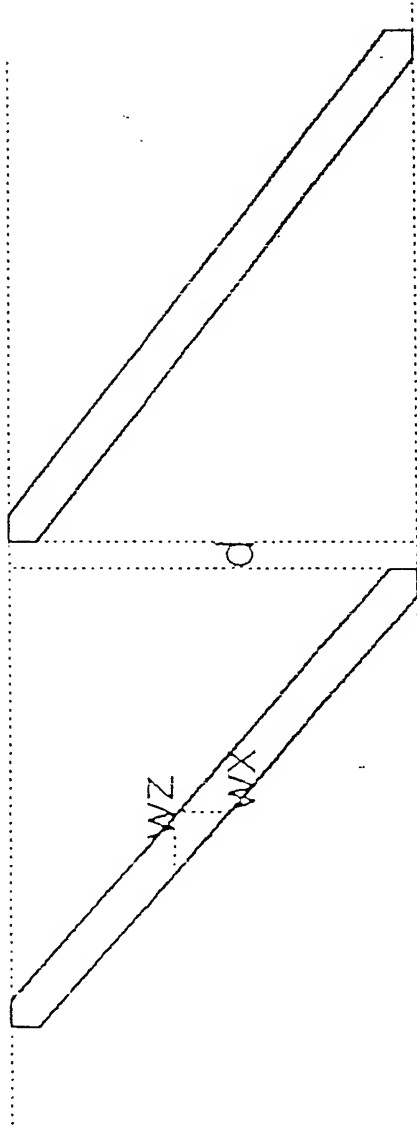


Fig. 24

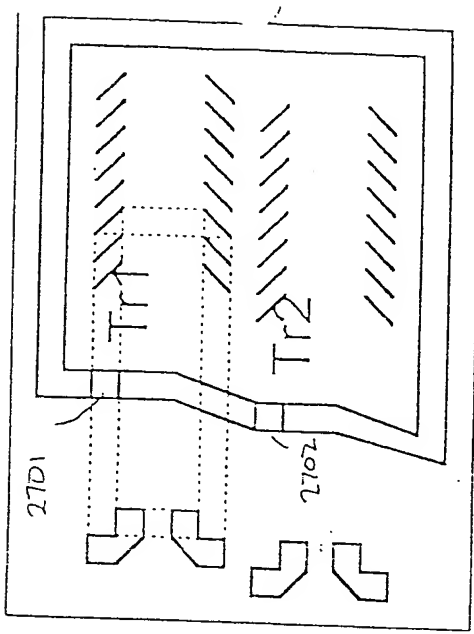


Fig. 27

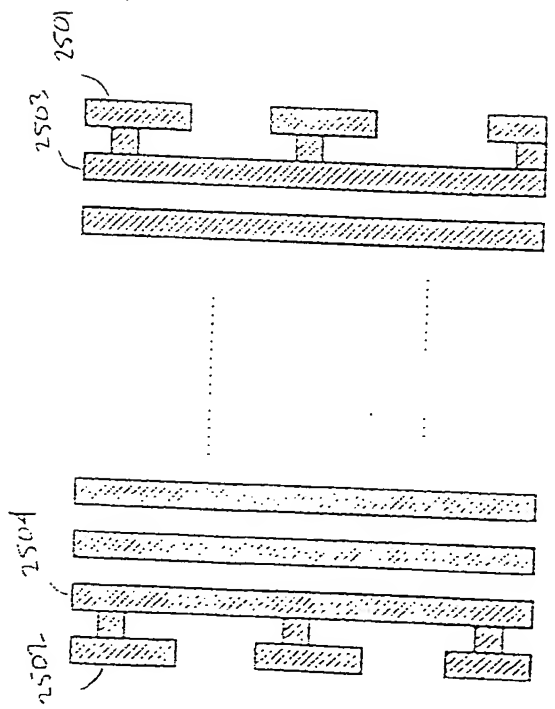


Fig. 25

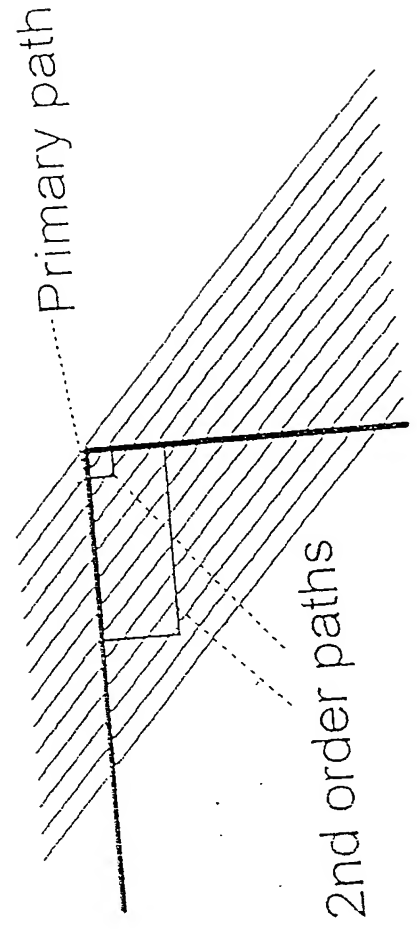


Fig. 26

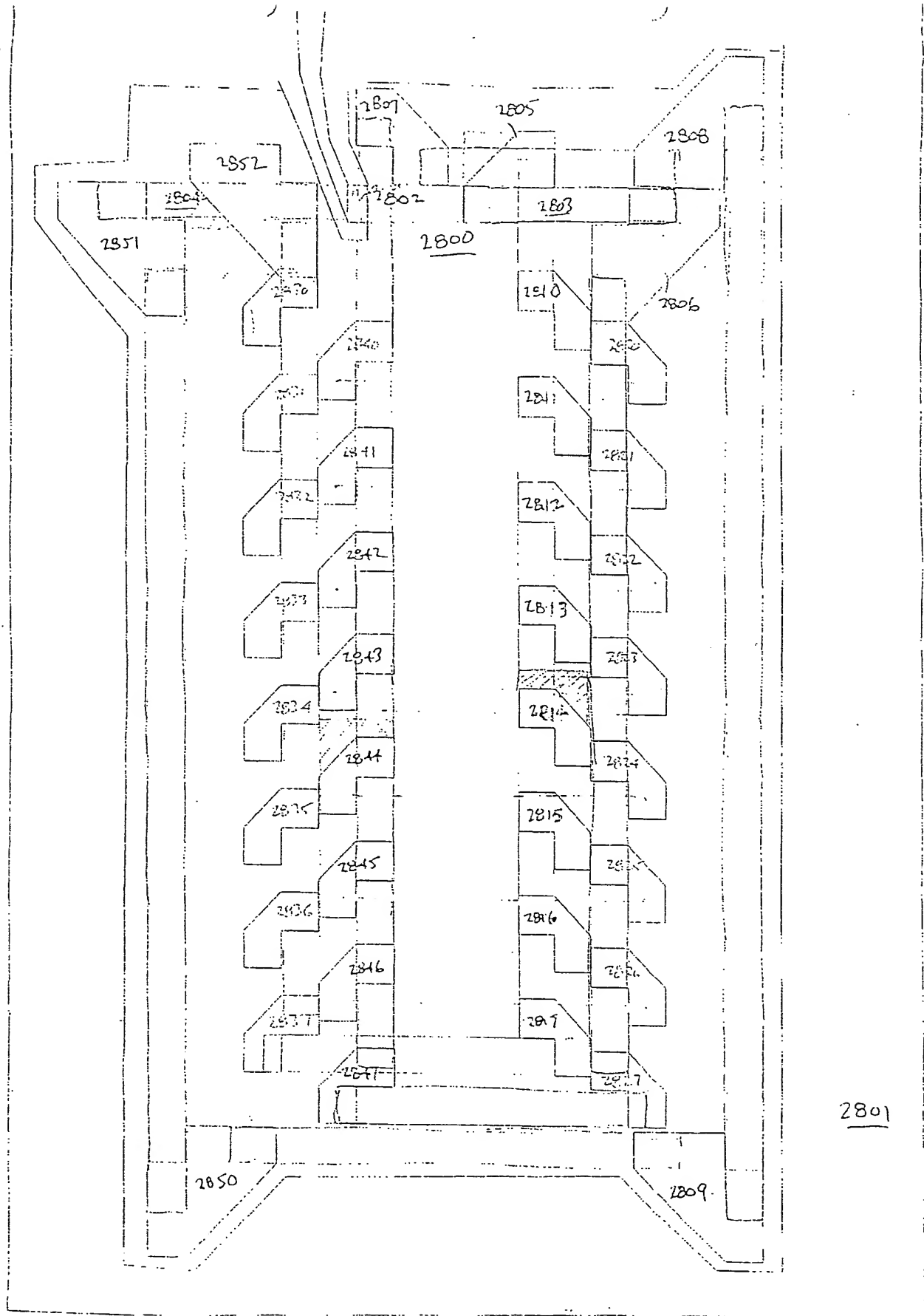
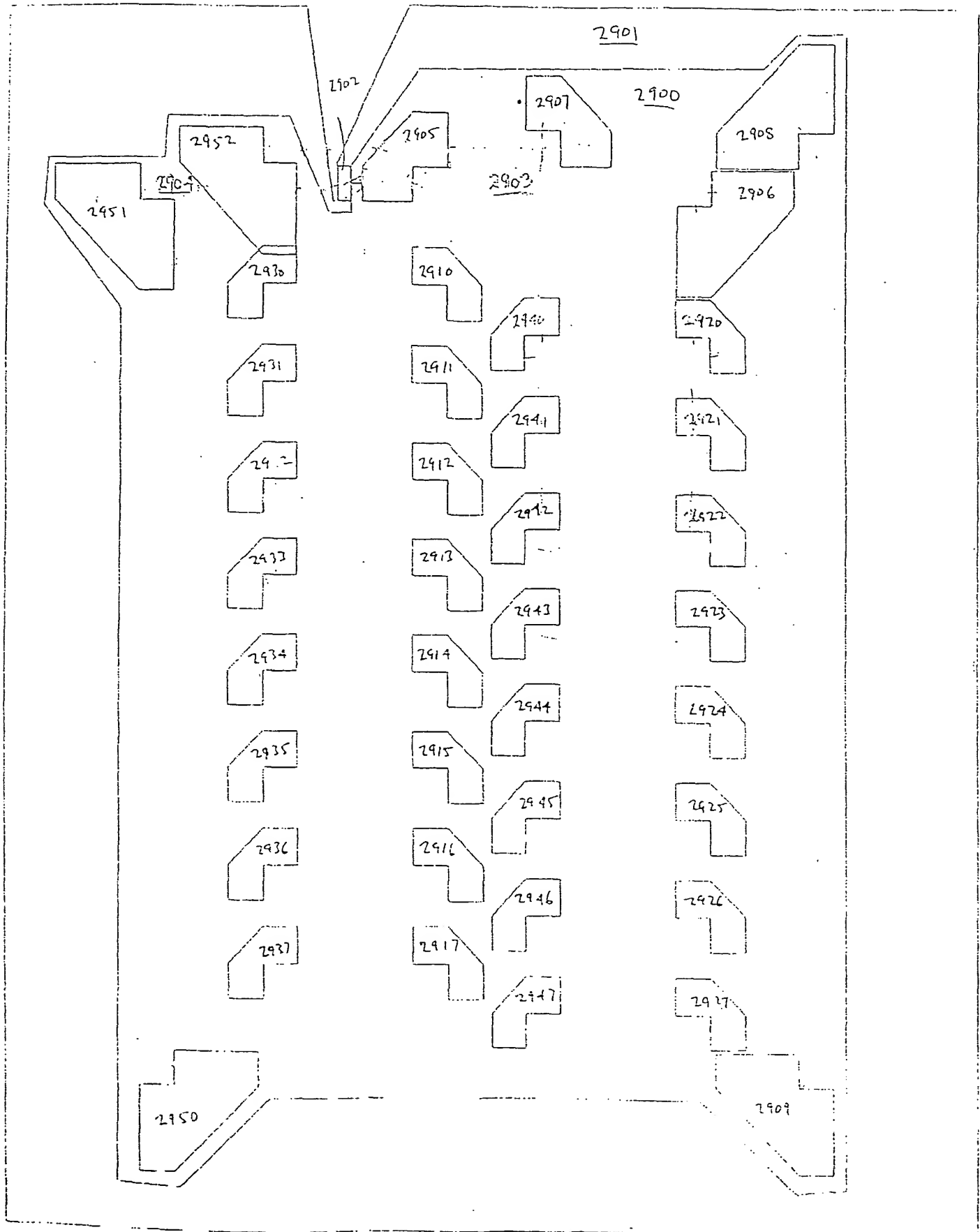
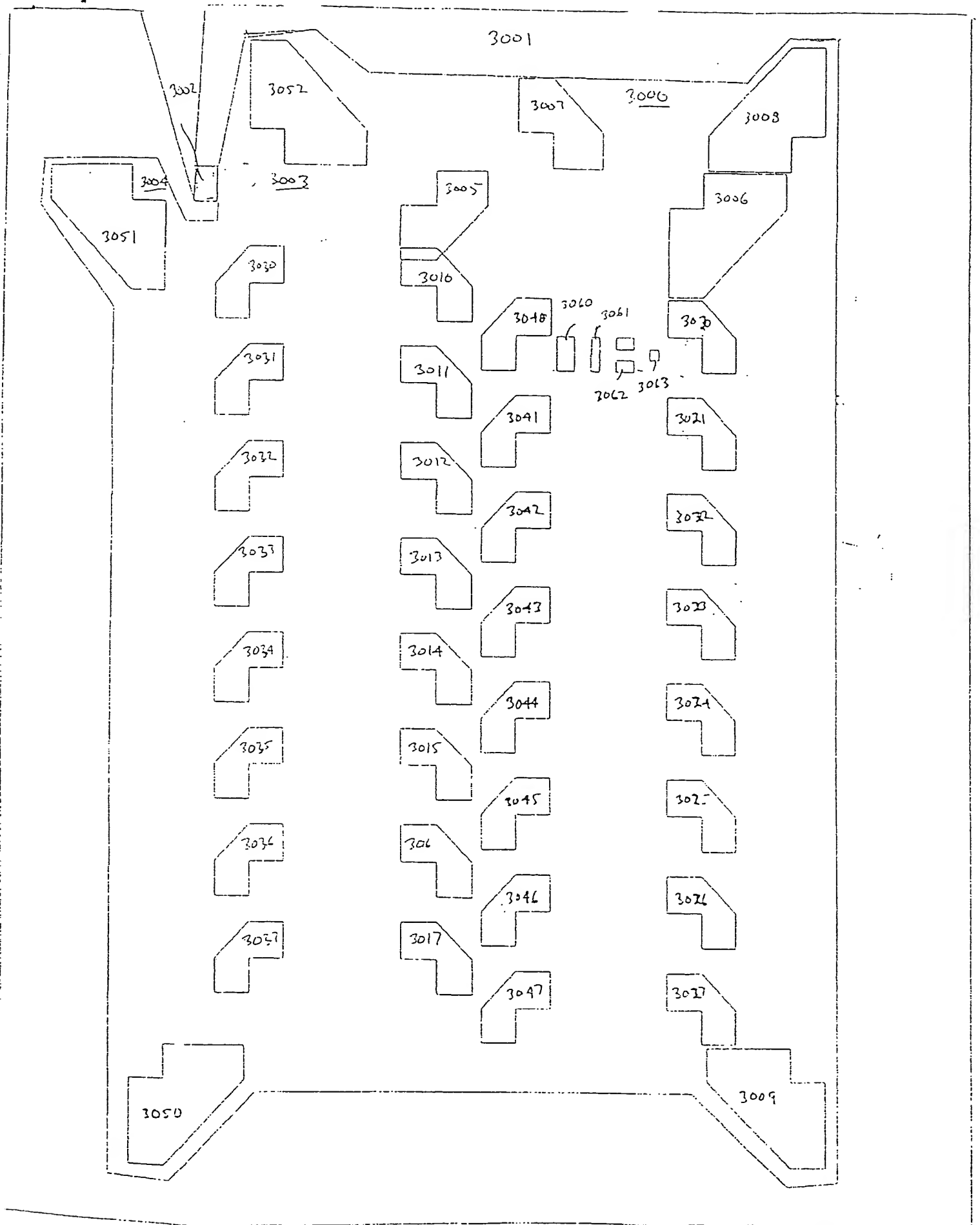


Fig. 28

Fig. 29.





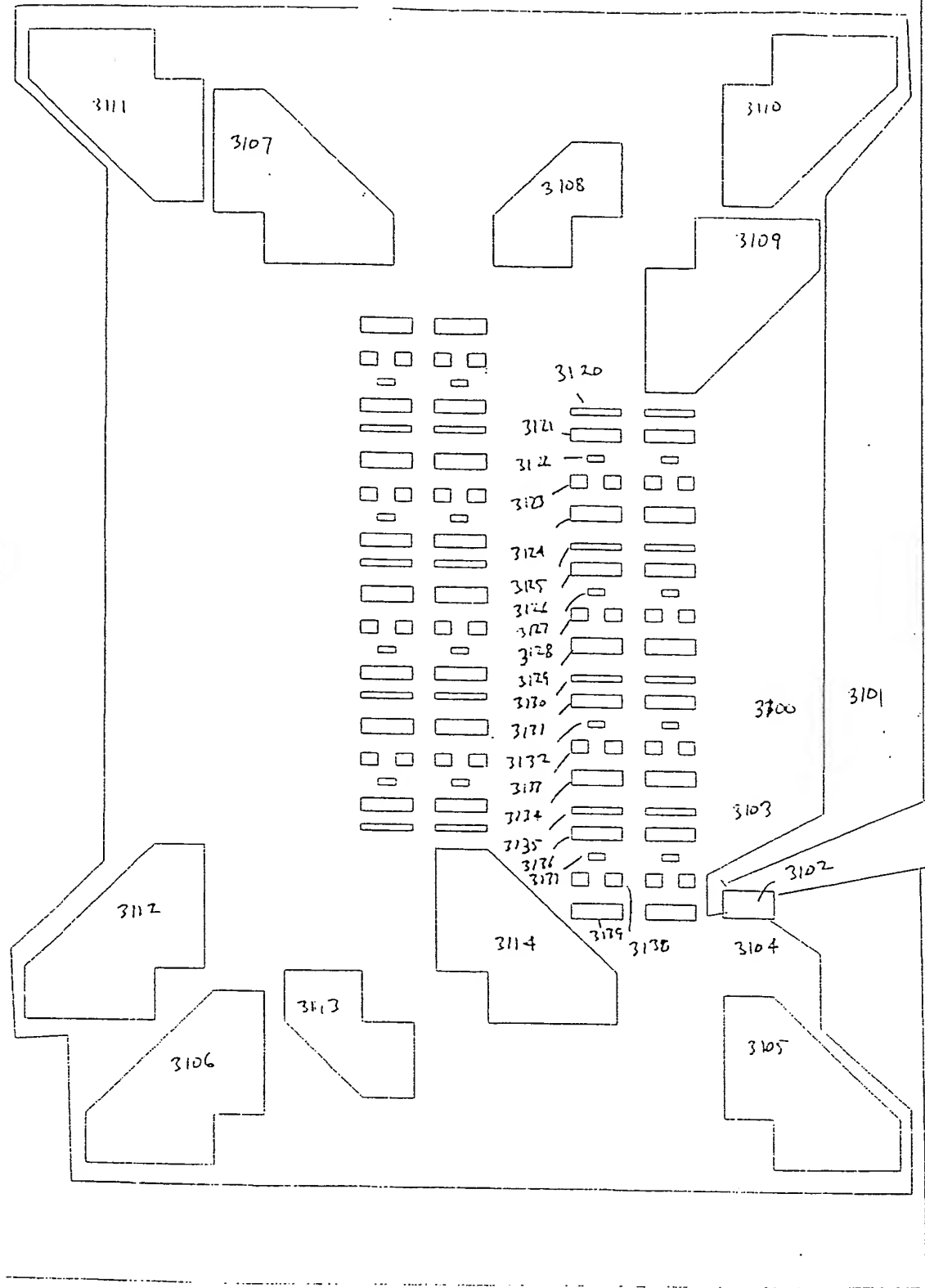


Fig. 31

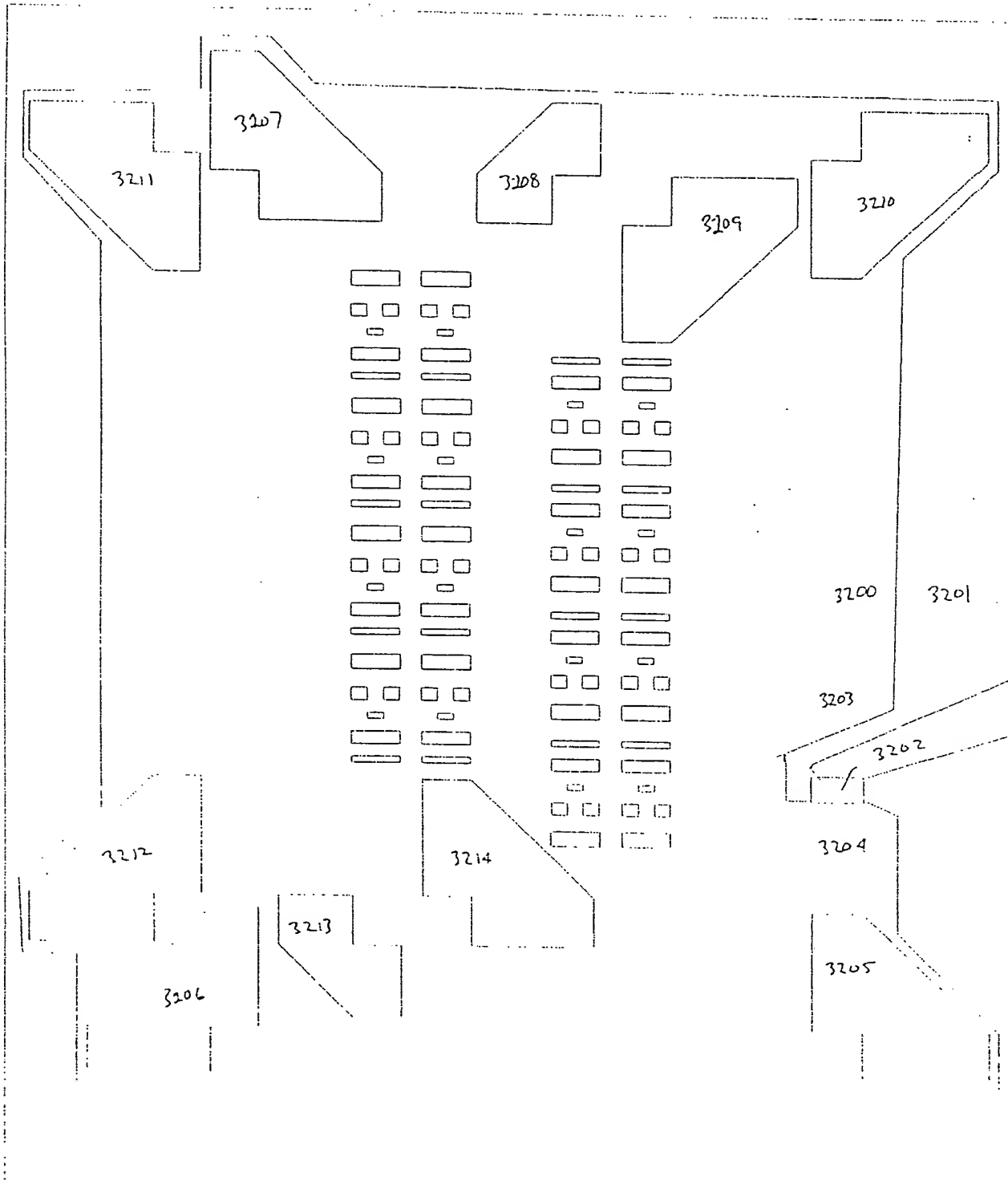


Fig. 32

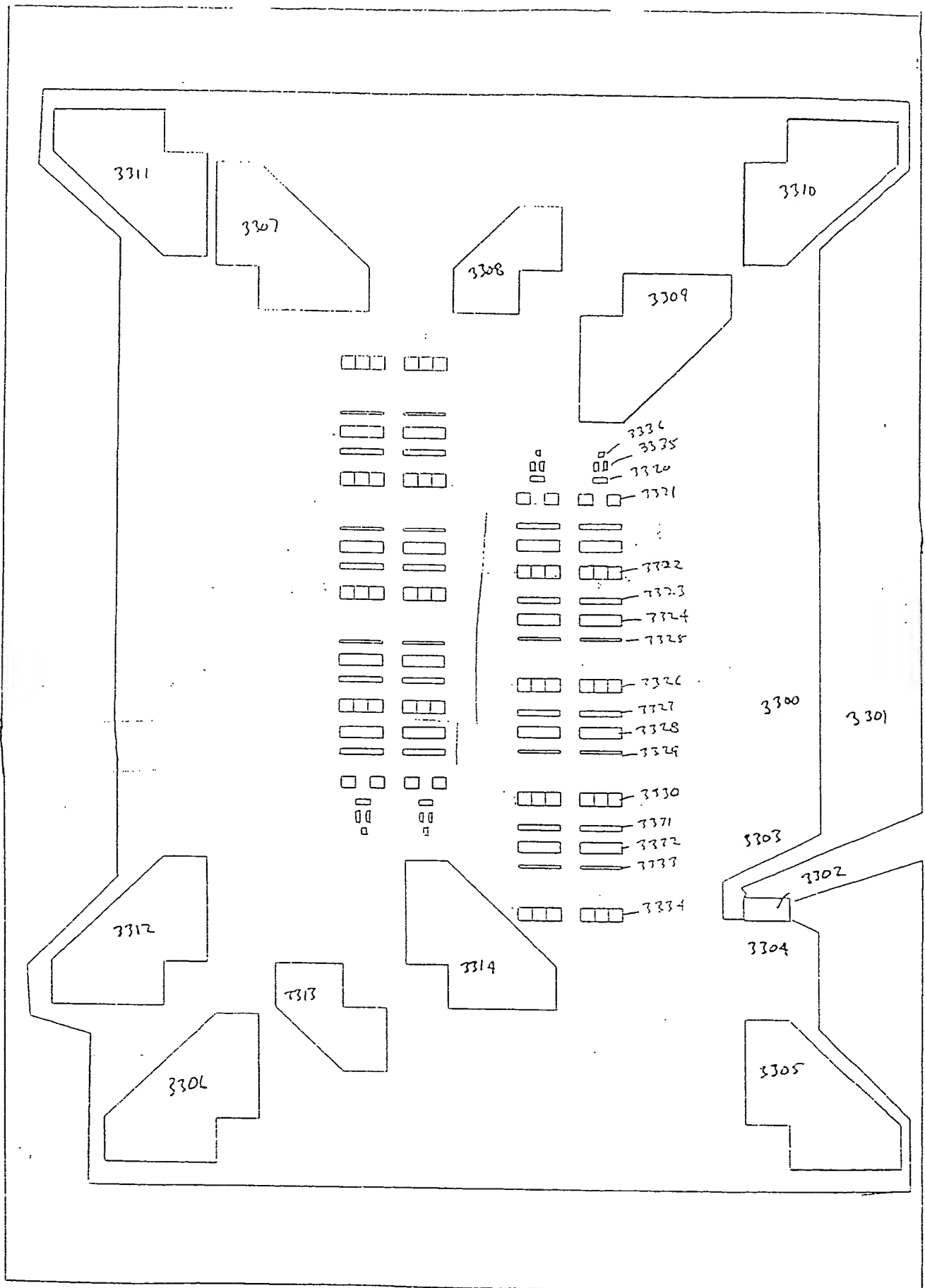


Fig. 33

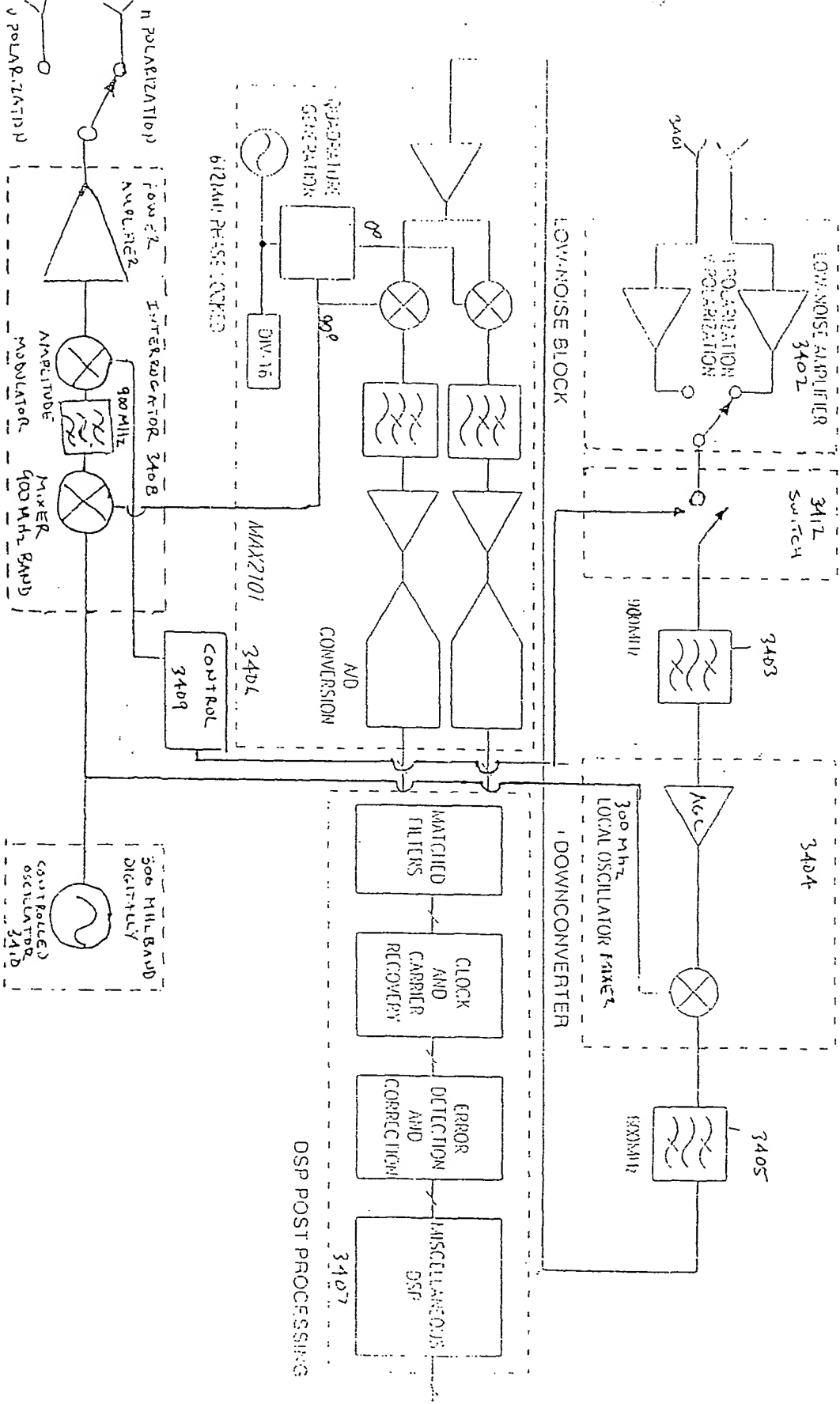


Fig. 34

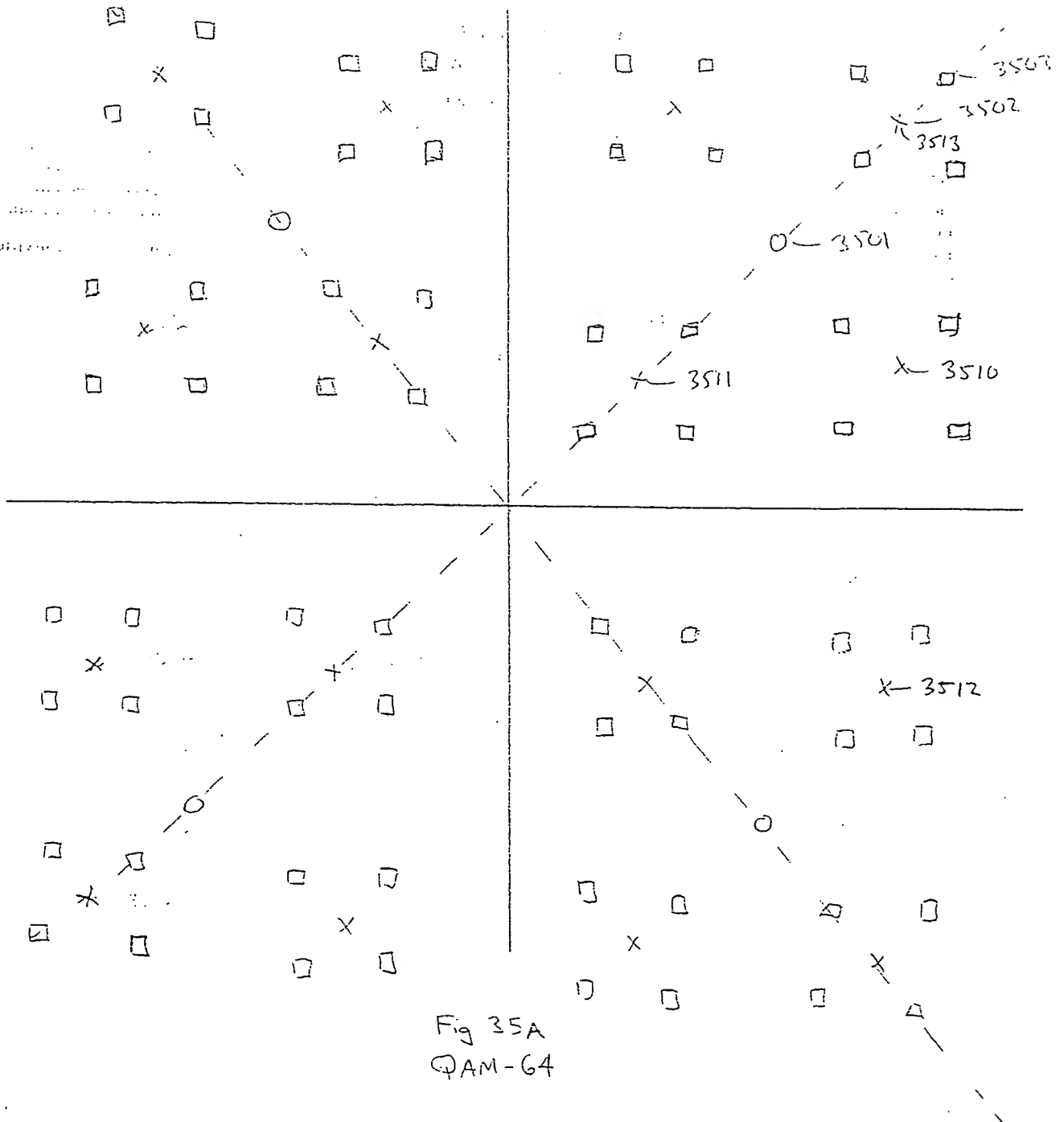


Fig 35A
QAM-64

Phase				
$\frac{\pi}{2}$	+	+	-	-
$\frac{\pi}{4}$	+	-	+	-
result				

Phase Splitting
Fig. 35B